Remarks

Further and favorable reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Claims 11-43 have been canceled. New claims 44-56 have been added to the application. The new claims are supported by page 6, line 21 - page 9, line 14 of the specification and the originally filed claims.

The objection to claim 43 has been rendered moot in view of the cancellation of this claim.

Although this response is submitted after final rejection, the amendments should be entered because they reduce the number of issues for appeal. The current amendment cancels the product claims, which were rejected by the Examiner, and presents only process claims, which have previously been considered.

The patentability of the present invention over the disclosures of the references relied upon by the Examiner in rejecting the claims will be apparent upon consideration of the following remarks.

The rejection of the product claims (claims 21-31 and 35-43) under 35 U.S.C. §102(b) as being anticipated by, or in the alternative, under 35 U.S.C. §103(a) as being obvious over WO 97/40076, is rendered moot by the cancellation of these claims. [It is noted that the Examiner also includes claims 32-34 in this rejection, but these claims are directed to the process rather than the product.]

The rejection of claims 11-21 under 35 U.S.C. §102(b) as being anticipated by Kasai et al., as applied to the new claims, is respectfully traversed. [It is noted that claim 21 is a product claim, whereas the middle of page 7 of the Office Action includes claim 21 among the process claims.]

The Examiner states that Applicants' arguments are not persuasive because the patentability of the process is primarily defined by the process steps, as well as the substances involved and the outcome of the process. The Examiner asserts that Kasai et al. do disclose the polymerization steps, the monodisperse spherical particles and the swelling capacity of the particles as recited in the instant claims.

Applicants continue to rely on the patentability arguments of record, specifically found on pages 8-10 of the Amendment filed March 15, 2004.

The present invention arrives at a more simple seed polymerization procedure for producing spherical polymer particles with a narrow size distribution than previously known procedures. The inventors have shown that it is possible to obtain spherical polymer particles with a narrow size distribution by seed polymerization from start particles produced by dispersion polymerization, wherein the start particles comprise polymer particles having a swelling capacity above 5 times their own volume, and wherein the monomers to be polymerized are added and swelled into the start particles directly and polymerized in one step to form the spherical polymer particles.

The process of Kasai et al. comprises preparing a dispersion of finely divided monomer droplets not larger than 0.8μm and not larger than the number average particle diameter of the seed particles, and so that the diameter of monomer droplets in a semi stable condition is always less than 3.5 times the desired number average particle diameter, and combining the monomer dispersion with seed particles in order to absorb the monomer on the seed particles, followed by polymerizing the monomer to obtain the product particles. (See column 3, lines 3-30 and claim 1 of Kasai et al.) The equation $0.5D < Dm < 3.5\ D$ (see column 31, line 21) for the semi stable monomer droplet size and its requirements strongly limits the freedom to obtain any size of product particles within the given size range.

Additionally, Kasai et al. teach that uniform polymer particles having a diameter in the range of 0.1μm to 0.9μm as obtained by soap-free emulsion polymerization can generally be used as seed particles. (See column 8, lines 65-68 of Kasai et al.) The polymer particles prepared by the process of Kasai et al. can be used as seed particles to prepare polymer particles having a much larger particle diameter, i.e. multistep seed polymerization process. (See column 9, lines 1-4 of Kasai et al.)

On the contrary, Applicants teach a one step polymerization process, using start particles which are produced by dispersion polymerization wherein the monomers are added and swelled into the start particles directly and polymerized in one step to form the desired spherical polymer particles. Applicants' process does not require the restriction of the monomer droplet size or the seed particles in order to achieve the desired size of spherical polymer particles.

Furthermore, in Kasai et al., the semi stable condition in the monomer droplet dispersion is controlled by adding to the monomer an oily substance having a water solubility of less than 1/100 of the monomer. The effect of the oily substance is demonstrated by adding n-hexane in an amount of 1 wt%, based on the weight of the MMA (monomer), to obtain a number average monomer droplet size of about 5 μm. (See column 6, lines 23-29). When the oily substance is not added, the droplets are too large and the process fails.

Applicants' claimed process has no such requirement for the addition of an oily substance to the monomer. The addition of such oily substances may have adverse effects on the product particles by limiting the freedom to design pore size distribution, limiting the freedom to make specific formulations, and by making it difficult to prepare particles which are free from solvents.

As discussed above, the Kasai et al. process has several drawbacks which are avoided by Applicants' invention. First, the size of the monomer droplets of Kasai et al. is less than 0.8 μm. This size requirement for the monomer droplets requires an energy intensive mixing process such as the use of sonication or a high pressure homogenizer. Second, the required monomer droplet size strongly limits the freedom to produce any particle size in the given size range in one step, as required by Applicants' claims. Third, Kasai et al. teaches the addition of an oily substance to control the semi stable condition in the monomer droplet dispersion, which can cause adverse effects on the product particles.

Kasai et al. do not teach a process for producing spherical polymer particles with monomer droplets which are larger than 0.8μm, or without the addition of an oily substance to control the droplet size of the monomer dispersion. Additionally, Kasai et al. do not teach porous particles wherein the content of pores with a diameter below 50Å is very low, as in Applicants' claims 48 and 49. Neither does Kasai et al. teach spherical product particles having a narrower size distribution than that of the seed particles, as in Applicants' claim 56.

Applicants' invention solves the problem of making narrow spherical particles and keeping the narrow size distribution. This process is different from the cited prior art because the start particles themselves have the ability to absorb or be swollen with new monomer in large amounts by simply adding the monomer to the start particles dispersed in water as a continuous medium. The monomer

diffuses through the water phase and becomes absorbed in the start particles without the need for any additional measures.

For these reasons, the invention of claims 44-56 is clearly patentable over Kasai et al.

Therefore, in view of the foregoing amendments and remarks, it is submitted that each of the grounds of rejection set forth by the Examiner has been overcome, and that the application is in condition for allowance. Such allowance is solicited.

Respectfully submitted,

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